

HF-SSB MICOM - LINK - FDN6123

# **HF-SSB MICOM - LINK**



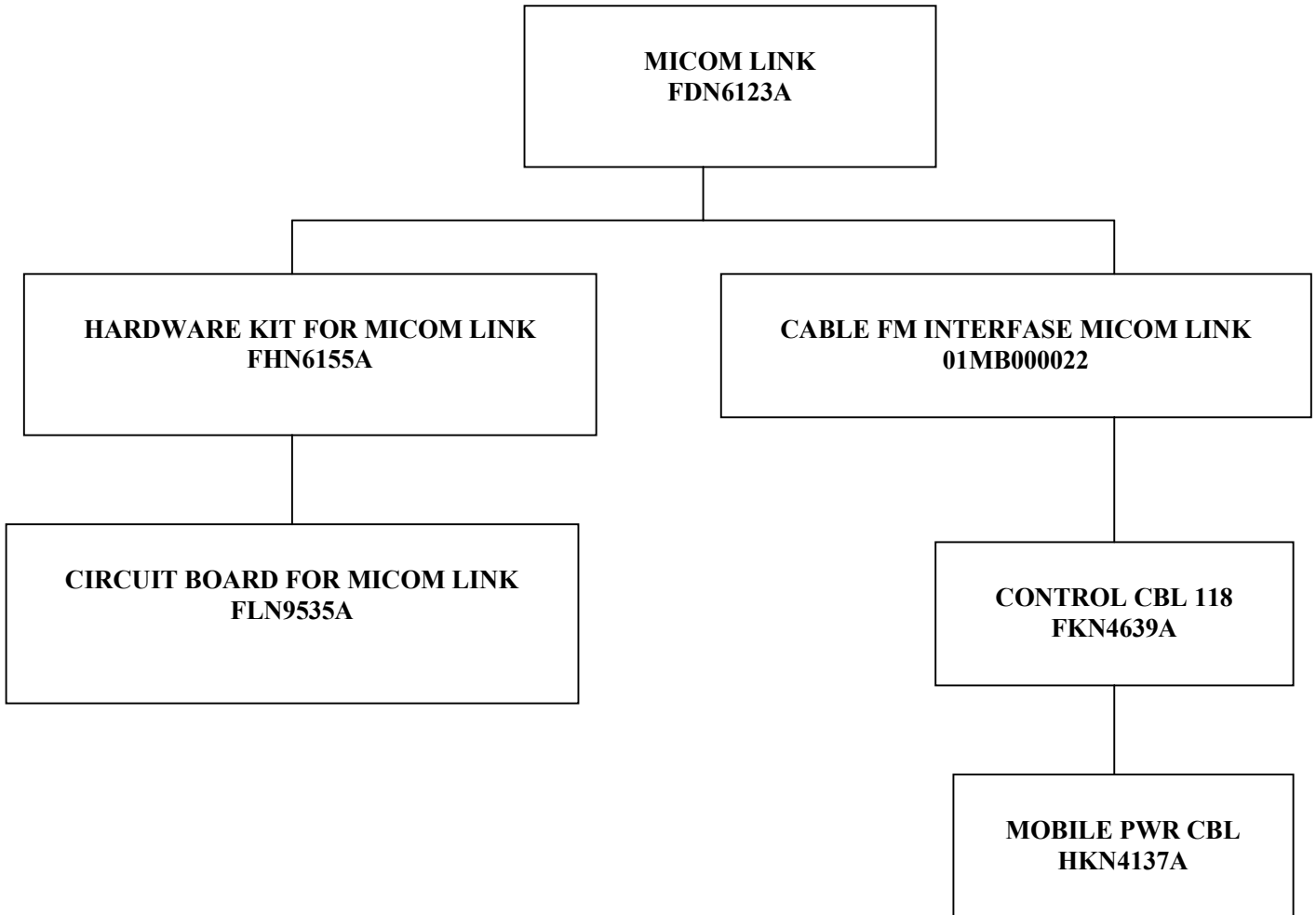
**Instruction Manual**  
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**MODEL COMPLEMENTS**



## **PERFORMANCE SPECIFICATIONS**

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Audio Inputs (from SSB Receivers)	-20 to +10 dBm, across 600 ohms (floating)
Audio Outputs:	
1. To FM transmitter	-4 dBm $\pm$ 3dBm across 600 ohms (floating)
2. To SSB transmitter	-16 dBm $\pm$ 4dBm across 600 ohms (floating)
3. Internal Speaker (4 ohms)	4 watts at 3% THD
Primary Voltage	13.8 Volts $\pm$ 20%
DC negative ground	
Current Drain (Maximum)	1A at full audio outputs
Operating Temperature Range	-30°C to +60°C
Grounding	All inputs and outputs are isolated from unit chassis.

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## **DESCRIPTION**

### **1. INTRODUCTION**

#### 1.1 GENERAL

The repeater Interface Unit (MICOM - LINK) is a compact, audio SSB to FM repeater, especially designed for cross-patching voice signals between VHF/UHF FM networks to an HF network.

A typical repeater station comprises an MICOM - LINK, a VHF/UHF radio and an HF radio set. The MICOM - LINK can be used in fixed or mobile station installation.

Figure 1 shows a typical MICOM - LINK system configurations. The unit accepts the received audio signal from a VHF/UHF radio set receiver and transfers it to an HF radio set transmitter and vice-versa.

In addition, the unit analyzes the transferred audio signals and generates PTT signals for the radio sets. Special precautions have been taken to prevent continuous lockup of the VHF/UHF FM network by an HF-SSB radio, even in the presence of strong interference from other HF transmitters.

#### 1.2 INTERFACING

MICOM - LINK connections to radio sets include the audio transmit, audio receive, PTT and ground lines. Therefore, radio sets having external connections for these lines are useable as is with the unit.

Since all unit input and output lines are floating, the unit may interface radio sets with negative and positive grounds.

The MICOM - LINK cables (FKN4639A, 01MB000022 and HKN4137A) supplied with the unit, has connectors suitable for MICOM-2 HF-SSB radio family and FM radio sets.

The MICOM - LINK may also be interfaced with other FM radios by replacing the standard, factory-supplied cable connectors. Contact your local distributor for further details.

### Typical Installation

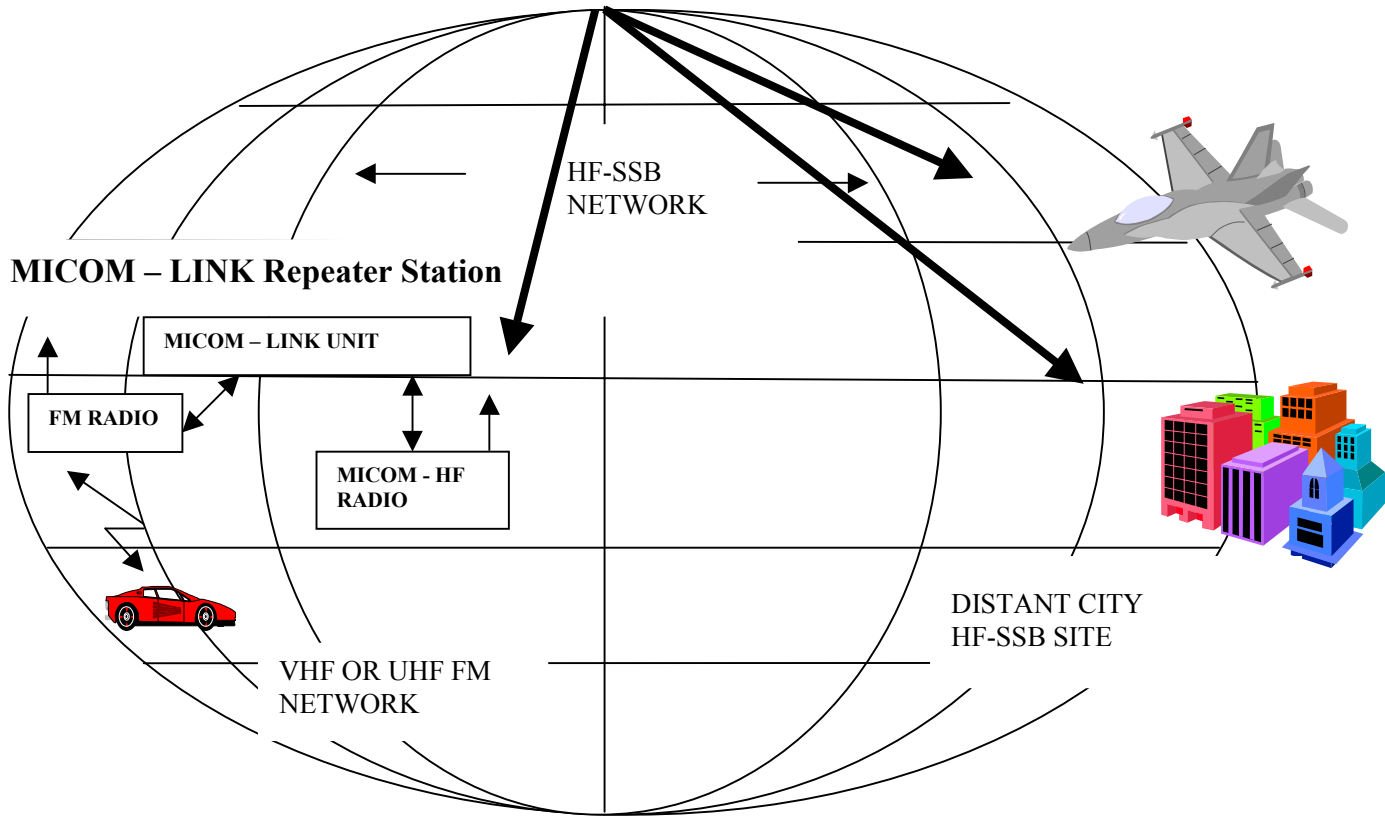


Figure: 1

## **2. OPERATING MODE**

Attended mode, in which the local operator controls the repeater operation.

The operator can:

Select manual (R1 or R2) or automatic (Auto) retransmission.

1. Automatics Monitor traffic in both networks using an internal speaker or headphones. LED indicators for both FM and SSB networks show, which is receiving a signal and to which network the signal is being transmitted
2. Manuals transmit on VHF/UHF FM or HF-SSB networks, independently, using a microphone connected to the unit.

## **3. SPECIAL FEATURES**

The MICOM - LINK provides unique features that solve the characteristic problems encountered in cross patching between HF and VHF/UHF networks.

### 3.1 GENERATION OF PTT SIGNALS

- a. VOC operation: The MICOM - LINK has two Voice-Operated Circuits that control its operation, SSB VOC (connected to the HF receive audio signal), and FM VOC (connected to the VHF/UHF receive audio signal). Both VOC circuits continuously analyze the received audio signals. When speech is recognized by one of the VOC circuits, the unit switches the other radio set to transmission, until the speech signal is interrupted for more than two seconds. This delay is essential to prevent undesirable transitions from transmission to reception that may be caused by normal pauses in speech. However, these VOC tails add 2.5 seconds to user waiting time on both networks (HF-SSB and VHF/UHF FM), after the unit stops transmission and before starting to speak (refer to para. 4).
- b. Carrier detects line. If the VHF/UHF or HF radios have an external carrier detects line this may be used for recognition in stead of processing the standard audio signal by the squelch hybrid circuit.

This line can thus be used to generate the PTT signal for the HF or VHF/UHF radio set.

The carrier detect select by standard jumpers located on the unit board (refer to Table 1).

### 3.2 AUTOMATIC FM, SSB PTT INTERRUPTER

This feature prevents continuous lockup of the entire VHF/UHF FM or HF-SSB networks by transmissions from the VHF/UHF FM or HF-SSB network (generally caused by interference from other stations operating on the same frequency). The interrupter checks the duration of continuous transmission by the VHF/UHF FM or HF-SSB radio. If the transmission is longer than 40 seconds, the VHF/UHF FM or HF-SSB radio is switched to the receive mode for a period of 5 seconds, to enable transmission by other users in the network.

### 3.3 FM, SSB END TONE

At the end of each repeater transmission on the VHF/UHF FM or HF-SSB network the MICOM - LINK inserts a 900-Hz tone for 0.5 second. This tone alerts a VHF/UHF FM or HF-SSB network user that the unit is on. Consequently, local FM communication can be unintentionally transmitted over the HF-SSB network and vice-versa.

In addition, this tone indicates to VHF/UHF FM network users that the transmission originated from the HF-SSB network and vice-versa.

The end tune select by standard jumper located on the board (refer to Table 1).

### 3.4 SIGNAL AND GROUND ISOLATION

Audio inputs and audio outputs signals are floating, and electrically isolated from the unit chassis.

This feature ensures total separation between the radio sets, and prevents RFI problems resulting from common ground loops.

### 3.5 PSOPH FILTER

The audio quality to the internal speaker can be improved by activating the PSOPH filter.

To activate the filter turn the P. filter switch to the right side and to turn off the filter take the switch to the other side.

### 3.6 FORCE PTT

In this mode the device will relay radio 1 to radio 2 and vice versa constantly according to the FORCE PTT switch position only on R1 or R2 Mode.

### 3.7 SPEAKER SQUELCH

If the switch is turn right the squelch is on. This mode activates the MICOM - LINK speaker all the time. Second mode when the switch is on the left side the squelch is off and the MICOM - LINK speaker is activate only when there is audio on the VOC.

## 4. **DELAY TIME**

To ensure reliable reception on both networks (HF-SSB and VHF/UHF-FM) **before replying to a call all users must wait a 3 second after the hear END TONE signal.**

### 4.1 HF-SSB USER DELAY TIME

For FM VOC - 3 to 3.5 seconds: This time delay consists of the 2.5-second FM VOC tail and an additional 0.5 to 1 second for system stabilization.

#### **NOTE**

**During the time delay described in Paragraphs above, the MICOM - LINK will not key the FM Radio. Therefore, the SSB network user cannot reply .**

### 4.2 VHF/UHF USER DELAY TIME

For SSB VOC - 3 to 3.5 seconds: This time delay consists of the 2.5-second SSB VOC tail, and an additional 0.5 to 1 second for system stabilization.

## INSTALLATION

### 1. GENERAL

#### 1.1 GOVERNMENT REGULATIONS

MICOM - LINK operation is in accordance with government regulations.

#### 1.2 INSPECTION

Carefully inspect the MICOM - LINK immediately upon receipt thereof, and notify the shipper of any damage incurred internist.

#### NOTE

**The MICOM - LINK is thoroughly tested and adjusted before leaving the factory. However, it should be checked before installation.**

#### 1.3 PRELIMINARY

The MICOM - LINK may be placed on any sturdy, horizontal surface. Select the placement location for convenience of access for electrical connections and for operation. The selected location should be clean, dry and well ventilated. Do not place the unit in close proximity to strong electrical fields produced by brush motors and generators, welders, etc.

#### 1.4 JUMPERS

Prior to unit installation, verify that the jumpers are installed according to the desired generation of PTT signals. Table 1 lists the various jumper settings.

Table 1. Jumper functions

JUMPER	FUNCTIONS	Positions	Factory Default
JP1	For A+ from HF, connect ground	In	In
JP2	FM Carrier Detect enable	In	Out
JP3	HF Carrier Detect enable	In	Out
JP4	FM End Tone Control	In	Out
JP5	HF End Tone Control	In	Out

## 2. INSTALLATION

### 2.1 CONNECTION TO RADIO SETS

#### 2.1.1 (FKN4639A) MICOM - LINK Cable Connections

This cable is supplied with connectors for connecting the MICOM. Assemble the appropriate connector on the cable according to the radio set in use

Refer to Table 2 and Figure 2 (page 10) for pin designations.

Table 2. Pin assignments of connector P1

Pin Number	In/Out	Name	Function	Notes
2	In	HF_CD_IN	Carrier detect	
4	In	HF_RX+	Differential receive audio	0dBm 600Ohm
5	In	HF_RX-	Differential receive audio	0dBm 600Ohm
6	Out	HF_TX+	Differential transmit audio	-9 – 0dBm 600Ohm
7	Out	HF_TX-	Differential transmit audio	-9 – 0dBm 600Ohm
8	Out	HF_PTT	PTT for transmitting voice	
11		HF_A+	Power from HF radio	13.8 VDC
18		HF_GND	Ground	

#### 2.1.2 (01MB000022) MICOM - LINK Cable Connections

This cable is supplied with connectors for connecting FM radio.

Refer to Table 3 and Figure 2 (page 11) for pin designations.

Table 3. Pin assignments of connector P2

Pin Number	Color	In/Out	Name	Function	Notes
2	brown	In	FM_CD_IN	Carrier detect	
4	orange	In	FM_RX+	Differential receive audio	0dBm 600Ohm
5	yellow	In	FM_RX-	Differential receive audio	0dBm 600Ohm
6	green	Out	FM_TX+	Differential transmit audio	-9 – 0dBm 600Ohm
7	blue	Out	FM_TX-	Differential transmit audio	-9 – 0dBm 600Ohm
8	purple	Out	FM_PTT	PTT for transmitting voice	
18			FM_GND	Ground	

### NOTE

**In case of using floating signals connect Pin 5, 7 to GND**

### 2.1.3 (HKN4137A) MICOM - LINK Cable Connections.

This cable is supplied with connectors for connecting power to the unit. Do not connect the power cable to the MICOM-LINK until you have completed all the connection to the unit.

The MICOM-LINK must be powered only from negative-ground electrical systems. Reverse polarity will not damage the unit, but will blow the cable fuse.

To HF-Radio

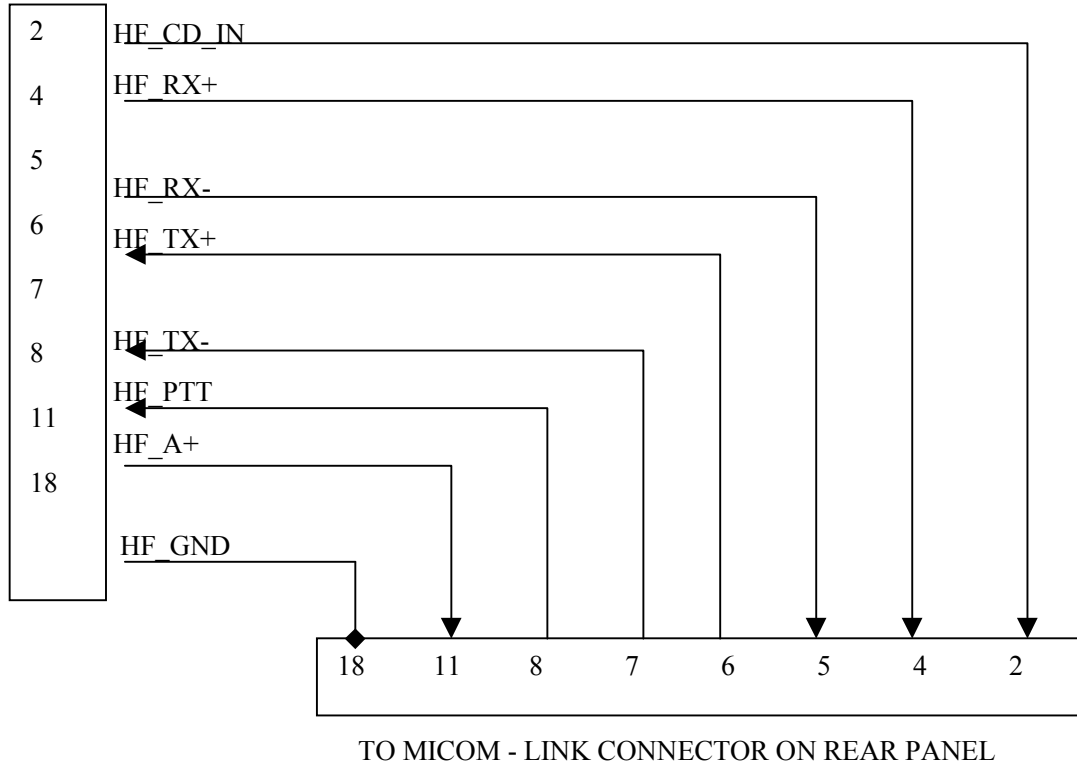


Figure 2. (FKN4639A) MICOM - LINK Cable

To VHF-UHF Radio

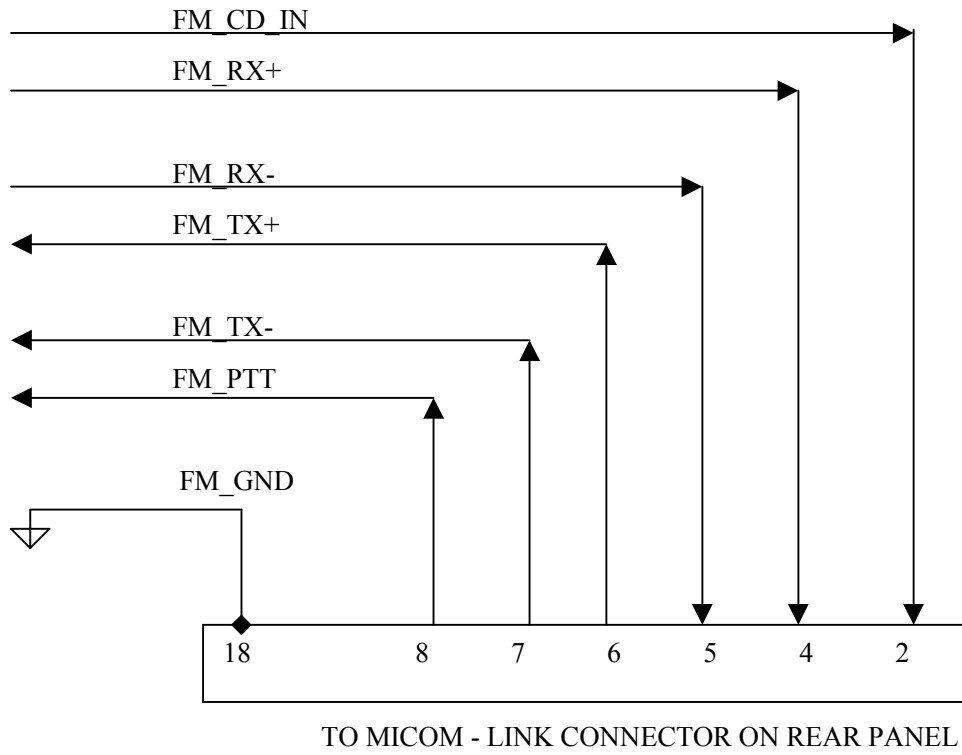


Figure 3. (01MB000022) MICOM - LINK Cable

## **OPERATION**

### **1. INTRODUCTION**

This section describes the controls, indicators and external connections available to the operator.

#### **1.1 CONTROLS**

The MICOM - LINK includes the following controls:

- A. The ON/OFF turns on the unit power red led is turn on (set on the front panel).
- B. The FM AUDIO VOLUME control connects the audio signal from the VHF/UHF FM network to the internal speaker/headphones and handset and also adjusts the volume (set on the front panel).
- C. The SSB AUDIO VOLUME control connects the audio signal from the HF-SSB network to the internal speaker/head phones and handset and also adjusts the volume (set on the front panel).

#### **NOTE**

**The audio signal is routed to the internal speaker/headphone only when the MICOM - LINK recognizes speech on one of the networks. If the two networks are active simultaneously, the network that was activated first is routed to the internal speaker/headphone.**

- D. The Mode selector switch determines, the MICOM - LINK operating mode. The various operating modes are listed in Table 1 below (set on the front panel).

Table 1. Unit Operation Mode

R1	R2	Operating Mode Switch
Auto		Attended mode, automatic retransmission
R1		Attended mode, operator may transmit on the VHF/UHF network
	R2	Attended mode, operator may transmit on the HF network

**NOTE**

**When the operating mode switch is in R1 or R2 position, relaying is interrupted and each radio set operates independently. However, the received signals of both radio sets can still be heard in the internal speaker or headphone.**

- E. The PTT toggle switch forces PTT to one of the radio sets; in the SSB (R2) position, the HF radio set is switched into transmission; in the FM (R1) position, the VHF/UHF radio set is switched into transmission. In the center-OFF position, it does not affect MICOM - LINK operation. This switch is enabled in the R1 or R2 retransmission mode only (located on the front panel).
- F. Placing the INTERRUPTER switch up (located on the rear panel) in the INT position activates the interrupter system. In the OFF position take down the switch, this system is disabled. The interrupter checks the duration of continuous transmission by the VHF/UHF FM or HF radio. If the transmission is longer than 40 seconds, the VHF/UHF FM or HF radio is switched to the receive mode for a period of 5 seconds, to enable transmission by other users in the network.
- G. The FILTER ON/OFF switch determines whether the audio signal is transmitted through the psoph filter or bypassed. The psoph filter is improving audio performance. When the switch is turn right the filter is activated and when the switch turn left the filter is OFF. (Located on the front panel)

- H. The SPKR SQ/NORM switch determines whether the audio signal is transmitted through the SQ hybrid or bypassed. When the switch is turn right the SQ is activated and when the sw turn left the SQ is OFF.

## 1.2 DISPLAYS

The MICOM - LINK includes the following indicators;

1. Power ON indicator (Red LED) lights to indicate that the unit is turned on.
2. R1 AUDIO RECEIVE indicator (Orange LED). Lights to indicate that a speech signal is received from the VHF/UHF network.
3. R1 PTT indicator (Green LED). Lights to indicate transmission of the VHF/UHF radio set initiated by the MICOM - LINK.
4. R2 AUDIO RECEIVE indicator (Orange LED). Lights to indicate that a speech signal is received from the HF network.
5. R2 PTT indicator (Green LED). Lights to indicate transmission of the HF radio set initiated by the MICOM - LINK.

## 1.3 CONNECTORS

The MICOM - LINK includes the following connectors:

- A. HF radio connector connects the MICOM-LINK to an HF radio (located on the rear panel).
- B. FM Radio connector connects, the unit to an FM radio (located on the rear panel).
- C. The microphone connector is RJ45 connector accepting a standard Motorola preamplifier microphone. However, a suitable handset can also be connected (located on the front panel).
- D. The headphone jack is a standard 1/4-inch two-circuit phone jack having the sleeve grounded to the radio chassis. Inserting the headphone plug silences the internal speaker (located on the front panel).
- D. The power connector connects the unit to a DC operating source and to external ground (located on the rear panel).

## **2. PRELIMINARY OPERATING NOTES**

- a. For best results, adjust the volume controls of both the HF and VHF/UHF radio sets to midrange or slightly below.
- b. On both radio sets, set the squelch to ON or OFF. It is recommended to set the SSB squelch to OFF.
- c. Check that the INTERRUPTER switch on the rear panel is at the desired setting.
- d. Notify all users that the MICOM - LINK is used to cross patch between HF and FM networks.

Inform FM and SSB network users of the significance of the end tone (to identify the source of the message - the tone is heard when the signal is received from an HF or VHF/UHF radio set, and it appears 2.5 seconds after the user stopped speaking). **FM or SSB network users must not start speaking before 3 second after end tone signal is heard.**

To ensure reliable reception on both networks, all users must wait a specified time before replying to a call.

### **NOTE**

**All users initiating a call should not expect an immediate answer from the called station.**

- e. For best results, it is recommended that any user should repeat the first word of his/her message two or three times, and then talk at a normal conversational rate, avoiding long pauses between words.

### **3. OPERATION**

#### 3.1 GENERAL

Ensure that the power source supplies  $13.8 \pm 20\%$  VDC to the MICOM - LINK.

#### 3.2 ATTENDED MODE OPERATION

- a. Turn on the MICOM - LINK and adjust the volume as desired.
- b. To transmit turn on the operating mode switch on the FM or SSB network, accordingly R1 or R2 is released.

Monitor the network to ensure that the network is unoccupied before transmitting.

When the transmit frequency becomes free, press the push-to-talk (PTT) button on the microphone to switch the selected radio set to transmit. Hold the microphone approximately six inches from the mouth and speak in a normal conversational tone.

Release the PTT switch to terminate the transmission; this switches the radio set back to reception.

- c. The FM and SSB networks AUDIO RECEIVE and PTT indicators display the status of the MICOM - LINK in real-time. Monitor these indicators to acquire information about the MICOM - LINK status.
- d. The FM and SSB VOLUME controls adjust the volume for each network separately, as desired.
- f. To switch, turn the operating mode switch to auto position to automatic retransmission. In this mode, the MICOM - LINK automatically transmits the signal received from one network, on the other network. When manual retransmission is required, use the PTT toggle switch to force transmission on either the FM or SSB networks, without regard of the signal received from each network.

**NOTE**

**On auto position the user can't transmit from the MICOM-LINK.**